DOE/RL-2001-68
Draft A



# Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility


United States
Department of Energy

For External Review

DOE/RL-2001-68
Draft A

# Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility

January 2002

United States Department of Energy

P.O. Box 550, Richland, Washington 99352

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# ACRONYMS

| | |
|---|---|
| ACM | asbestos-containing material |
| ALARA | as low as reasonably achievable |
| ARAR | applicable or relevant and appropriate requirement |
| CERCLA | *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* |
| BHI | Bechtel Hanford, Inc. |
| CFR | *Code of Federal Regulations* |
| CWC | Central Waste Complex |
| D&D | decontamination and decommissioning |
| DOE | U.S. Department of Energy |
| Ecology | Washington State Department of Ecology |
| EE/CA | *Engineering Evaluation/Cost Analysis* |
| EPA | U.S. Environmental Protection Agency |
| ERC | Environmental Restoration Contractor |
| ERDF | Environmental Restoration and Disposal Facility |
| ETF | Effluent Treatment Facility |
| FR | *Federal Register* |
| FSB | fuel storage building |
| HASP | health and safety plan |
| HEPA | high-efficiency particulate air |
| HGET | Hanford General Employee Training |
| LDR | land disposal restriction |
| OSHA | Occupational Safety and Health Administration |
| PCB | polychlorinated biphenyls |
| PHMC | Project Hanford Management Contractor |
| PMII | Project Manager's Implementing Instructions |
| PPE | personal protective equipment |
| RCRA | *Resource Conservation and Recovery Act of 1976* |
| RCT | radiological control technician |
| RL | DOE, Richland Operations Office |
| RWP | radiological work permit |
| S&M | surveillance and maintenance |
| SM&T | surveillance, maintenance, and transition |
| SS HASP | site-specific health and safety plan |
| SSWMI | site specific waste management instruction |
| Tri-Party Agreement | *Hanford Federal Facility Agreement and Consent Order* |
| TSCA | *Toxic Substances Control Act of 1976* |
| TSD | treatment, storage, and disposal |
| WAC | *Washington Administrative Code* |

# METRIC CONVERSION CHART

| Into Metric Units | | |
|---|---|---|
| *If You Know* | *Multiply By* | *To Get* |
| **Length** | | |
| inches | 25.4 | millimeters |
| inches | 2.54 | centimeters |
| feet | 0.305 | meters |
| yards | 0.914 | meters |
| miles | 1.609 | kilometers |
| **Area** | | |
| sq. inches | 6.452 | sq. centimeters |
| sq. feet | 0.093 | sq. meters |
| sq. yards | 0.836 | sq. meters |
| sq. miles | 2.6 | sq. kilometers |
| acres | 0.405 | hectares |
| **Mass (weight)** | | |
| ounces | 28.35 | grams |
| pounds | 0.454 | kilograms |
| ton | 0.907 | metric ton |
| **Volume** | | |
| teaspoons | 5 | milliliters |
| tablespoons | 15 | milliliters |
| fluid ounces | 30 | milliliters |
| cups | 0.24 | liters |
| pints | 0.47 | liters |
| quarts | 0.95 | liters |
| gallons | 3.8 | liters |
| cubic feet | 0.028 | cubic meters |
| cubic yards | 0.765 | cubic meters |
| **Temperature** | | |
| Fahrenheit | subtract 32, then multiply by 5/9 | Celsius |
| **Radioactivity** | | |
| picocuries | 37 | millibecquerel |

| Out of Metric Units | | |
|---|---|---|
| *If You Know* | *Multiply By* | *To Get* |
| **Length** | | |
| millimeters | 0.039 | inches |
| centimeters | 0.394 | inches |
| meters | 3.281 | feet |
| meters | 1.094 | yards |
| kilometers | 0.621 | miles |
| **Area** | | |
| sq. centimeters | 0.155 | sq. inches |
| sq. meters | 10.76 | sq. feet |
| sq. meters | 1.196 | sq. yards |
| sq. kilometers | 0.4 | sq. miles |
| hectares | 2.47 | acres |
| **Mass (weight)** | | |
| grams | 0.035 | ounces |
| kilograms | 2.205 | pounds |
| metric ton | 1.102 | ton |
| **Volume** | | |
| milliliters | 0.033 | fluid ounces |
| liters | 2.1 | pints |
| liters | 1.057 | quarts |
| liters | 0.264 | gallons |
| cubic meters | 35.315 | cubic feet |
| cubic meters | 1.308 | cubic yards |
| **Temperature** | | |
| Celsius | multiply by 9/5, then add 32 | Fahrenheit |
| **Radioactivity** | | |
| millibecquerels | 0.027 | picocuries |

# 1.0 INTRODUCTION

This document provides an opportunity to combine the B Reactor removal action work plan and the surveillance and maintenance (S&M) plan for an interim 10-year period of time. These documents have many similarities and, by combining them, text can be streamlined and efficiencies gained.

The 105-B Reactor Facility[1] is located in the 100-B Area of the Hanford Site, which is owned and operated by the U.S. Department of Energy (DOE), in Benton County, Washington. The 100 Areas (including the 100-B Area) of the Hanford Site were placed on the U.S. Environmental Protection Agency's (EPA's) National Priorities List under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). The DOE has determined that hazardous substances in the 105-B Reactor Facility present a potential threat to human health or the environment. The DOE has also determined that a non-time-critical removal action is warranted at these facilities.

Alternatives for conducting a non-time-critical removal action were evaluated in the *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility* (EE/CA) (DOE-RL 2001). Removal action evaluation and selection was complicated by the historical significance of the 105-B Reactor Facility. The 105-B Reactor Facility was the world's first full-scale production reactor and produced plutonium fuel for the world's first nuclear device and for the "Fat Man" atomic bomb detonated at Nagasaki, Japan, on August 8, 1945. Therefore, removal action alternatives were analyzed only for a 10-year time period. Long-term removal actions at the 105-B Reactor Facility were not proposed in the EE/CA because a DOE decision on its final configuration, which may include preservation of some or all of the facility structure and contents, is pending.

The EE/CA resulted in the recommendation to perform hazard mitigation actions in support of public access to the 105-B Reactor Facility for a 10-year period. The DOE is the agency responsible for implementing the removal actions in the 100-B Area, and EPA is the lead regulatory agency. This removal action work plan supports implementation of the non-time-critical removal action. The S&M components of this plan provide for the implementation of activities to ensure that the 105-B Reactor Facility is maintained in a safe, environmentally secure, and cost-effective manner during the removal action.

## 1.1 PURPOSE AND OBJECTIVE OF THE REMOVAL ACTION WORK PLAN

The purpose of this removal action work plan is to establish the methods and activities required to perform the following functions:

- Provide upgrades to facility infrastructures to ensure that risks to the public and workers from remaining hazardous substances are minimized.

[1] The term "Facility" is used generically to encompass all the structures, buildings, tunnels, piping, etc., associated with the reactor building.

- Remove, decontaminate, contain, or encapsulate hazardous substances in publicly accessible areas of the 105-B Reactor Facility.

- Perform routine S&M activities in all areas of the 105-B Reactor Facility to protect workers and the public and prevent releases of hazardous substances to the environment during the 10-year interim action.

- Manage and dispose of all waste generated during these actions.

This removal action work plan satisfies the requirement to submit a work plan outlining how compliance with applicable regulations (refer to Section 4.1) will be achieved for implementation of the selected removal action alternative. Additionally, it serves as the S&M plan for this action. This removal action work plan was prepared in accordance with Section 7.2.4 of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1998).

The intent of this removal action work plan is to identify the basis and provide guidance for preparation of work packages and subcontract task orders for the project tasks. Using the most recent information concerning facility conditions, field-level work packages will be developed to direct work activities and instruct workers in the most applicable work methods. Existing procedures (as well as specifically developed instructions) will be used to perform and control the facility removal and disposal actions.

The 105-B Reactor Facility project schedule, which encompasses the work scope through project completion, presents the logical progression of events and estimated durations for each activity. The project schedule, included as Appendix A, is presented by fiscal year.

## 1.2 PURPOSE AND OBJECTIVES OF THE SURVEILLANCE AND MAINTENANCE PLAN

The purpose of the S&M activities identified in this document is to ensure that the 105-B Reactor Facility is maintained in a safe, environmentally secure, and cost-effective manner until a final decision is made on the long-term status (e.g., historic preservation, interim safe storage) of the 105-B Reactor Facility structure and contents. S&M activities encompass all areas of the 105-B Reactor Facility including the areas designated for visitor access (i.e., the tour route). This information has been prepared in accordance with the guidelines provided in the DOE Office of Environmental Management Decommissioning Resource Manual (DOE 1995) and Section 8.6 of the Tri-Party Agreement (Ecology et al. 1998). Additionally, completion of this plan meets the Tri-Party Agreement Milestone M-93-06 "Complete Surveillance and Maintenance Plan for B Reactor" by June 30, 2002.

Many objectives of the S&M program may be similar or overlap those of the removal action work plan. Specific objectives of the S&M program are as follows:

- Ensure adequate confinement of remaining radioactive materials and hazardous substances
- Maintain access control for entries into the 105-B Reactor Facility
- Maintain the 105-B Reactor Facility in a manner that will minimize potential risks to the public, the environment, and onsite workers
- Provide adequate frequency of inspections to identify new potential hazards
- Maintain selected systems or equipment that will be essential for worker safety during hazard mitigation and to ensure safe public access
- Provide a mechanism for the identification and compliance with applicable environmental, safety and health, and safeguard and security requirements
- Preserve crucial information, documentation, and 105-B Reactor Facility artifacts to ensure compliance with future disposition decision(s) regarding the final end-state of the 105-B Reactor Facility
- Inspect and mitigate potential hazards associated with the natural aging of the facility that are above risk thresholds and warrant action in order to protect workers, the public, or the environment.

## 1.3 OBJECTIVES OF THE REMOVAL ACTION

The primary goal of CERCLA removal actions is to minimize or eliminate threats to public health or the environment caused by the presence of hazardous substances. The EE/CA for the 105-B Reactor Facility (DOE-RL 2001) presented three alternative approaches for future facility management and the resulting levels of protection of public health and the environment that may be anticipated. Based on the evaluation, hazard mitigation in support of public access was selected as the most responsive approach to ensure protection of human health and the environment and historical preservation pending DOE decision making.

The selected removal action will allow public access into the 105-B Reactor Facility during the 10-year interim action. It will effectively mitigate hazards associated with hazardous substances to the extent that exposure is minimized or eliminated. Wastes that would be generated during maintenance and removal activities would be disposed in the Environmental Restoration Disposal Facility (ERDF), which would provide reliable long-term protection.

Based on the potential hazards, the specific removal action objectives are as follows:

- Reduce or eliminate the potential for exposure to hazardous substances.
- Reduce or eliminate the potential for a future release of contaminants.
- Protect workers from the hazards posed by the continuing deterioration and aging of the 105-B Reactor Facility.
- Prevent potentially adverse impacts to cultural/natural resources and threatened or endangered species.
- Safely manage the wastes generated by the removal action.
- Take no action that will preclude use of any and all portions of the 105-B Reactor Facility for historical interpretation until a decision is made by DOE as to the final configuration of the 105-B Reactor Facility.

## 1.4 FACILITY DESCRIPTION AND HISTORICAL SIGNIFICANCE

This section provides a facility description and a history of the 105-B Reactor Facility and describes portions of the facility to be mitigated for public access.

### 1.4.1 Facility Description

The 105-B Reactor Facility is located along the Columbia River in the northern portion of the Hanford Site in southeastern Washington State (Figure 1-1). Groundbreaking for the construction of the 105-B Reactor Facility began in October 1943 by the U.S. Army Corps of Engineers as a part of the Manhattan Project to produce sufficient quantities of weapons-grade plutonium for construction of a nuclear bomb. The reactor operated from 1944 to 1946 initially and was taken out of service from 1946 until 1948. In June 1948, the 105-B Reactor Facility was restarted and operated until 1968. Final shutdown and deactivation of the facility occurred during 1968. Deactivation of this facility has included de-energizing nonessential electrical sources and equipment, preserving tools and equipment, conducting routine housekeeping and radiological surveys, and applying fixatives to many contaminated surfaces. Although the 105-B Reactor Facility has not been fully decontaminated, nonessential systems and equipment (e.g., electrical and water that support reactor operations) have been deactivated and drain lines and contaminated materials have been removed.

The 105-B Reactor Facility is a steel-reinforced concrete and concrete block structure (Figures 1-2 and 1-3). It contains a reactor block, control room, spent fuel discharge area, fuel storage basin (FSB), fans and ducts for ventilation and recirculating inert gas systems, water cooling systems, support offices, shops, and laboratories. Within the reactor facility, massive reinforced concrete walls (0.9 to 1.5 m [3 to 5 ft] thick) extend upward to the height of the

reactor block to provide shielding, with the upper sections constructed of concrete block. Asbestos, radiological, and hazardous material contamination exist at varying levels in the building.

The roof of the 105-B Reactor Facility is composed of pre-cast concrete roof tile, except over the discharge area enclosure (the rear face) and the inner horizontal rod room. Over those areas, the roof is composed of 1.8-m (6-ft)-thick reinforced concrete (Gerber 1993). The original pre-cast concrete tiles remain in place. Repairs have been made to individual pre-cast roof panels that were showing signs of excessive deflection and corrosion (WHC 1994). The 105-B Reactor Facility underwent interim roof repair in fiscal year 2001. Total roof replacement is identified in the EE/CA (DOE-RL 2001).

The following provides a brief description of some of the areas or rooms contained within the 105-B Reactor Facility that are of significance to this plan (part of the proposed or current tour route). Figure 1-3 shows a schematic drawing of the main reactor facility and the features described below.

***Reactor Block.*** The reactor block consists of the following: a 1.8-m (6-ft)-thick concrete foundation; a steel baseplate 3.8 cm (1.5 in.) thick; a cast iron bottom shield 0.25 m (10 in.) thick; a cubical stack of graphite blocks 11 m (36 ft) wide, 11 m (36 ft) tall, and 8.5 m (28 ft) front to rear; cast iron thermal shield walls and cover approximately 0.25 m (10 in.) thick surrounding the graphite; steel and masonite biological shield walls and cover about 1.2 m (4 ft) thick; welded gas-tight seams and seals; and 2,004 aluminum process tubes, running from the front face to the rear face of the reactor block, to hold the uranium fuel and carry the cooling water. The reactor block is located in the center of the 105-B Building and is bordered on the west by the front-face work area (room 110) and to the east by the FSB/transfer area (room 410). The reactor block is not currently or proposed to be part of the tour route.

***Front-Face Work Area.*** The front-face work area (room 110) is a 204-$m^2$ (2,200-$ft^2$) concrete room west of the charging face of the reactor block. The work area is sufficiently large enough that the 12-m (40-ft)-long aluminum process tubes could be inserted or removed from the reactor block for maintenance purposes. Several spots of fixed radioactive contamination exist on the floor of the front-face work area. The contamination has been painted over, and locations are clearly marked on the work area floor. The front-face work area is part of the present 105-B Reactor Facility tour route and contains a number of museum displays and interpretational items.

***Valve Pit.*** Adjacent to and west of the front-face work area is the valve pit. The valve pit is surrounded at grade with a grated metal walkway. Below grade, the valve pit houses the main connections, piping, and control valves for the process water lines that came from the 190-B Process Pump House (now demolished) to the reactor block. The walkway elevated above the valve pit offers access to the supply fan and exhaust fan rooms (rooms 311 through 315), as well as the flow lab/machine maintenance room (room 231a). The valve pit is on the existing tour route and is visible over the railing.

***Supply Fan/Exhaust Fan Rooms.*** The supply fan room (room 315) is located to the south of the valve pit. The supply fan room contains the main blowers, heaters, and air filters for the entire 105-B Reactor Facility heating and ventilation systems. There are two dual-drive supply fans and four exhaust fans. The exhaust fans, numbered 9 through 12, are isolated from the supply system in separate concrete cubicles (rooms 311, 312, 313, and 314). A concrete duct connected the fan room to the 61-m (200-ft)-tall reactor stack (116-B) via the 117-B Filter Building, which has been demolished. This equipment is inactive. The supply fan rooms will be proposed additions to the tour route, and the exhaust fan rooms will be visible over the railing.

***Flow Lab/Machine Maintenance Room.*** The flow lab/machine maintenance room (room 231a) is located west of the valve pit and north of the supply fan (room 315). The room is empty and will be upgraded to provide an egress to the exterior west side of the building. This room will be a proposed addition to the tour route.

***Office/Storage Room.*** The office/storage room (room 228a) is located on the west side of the 105-B Reactor Facility, adjacent to the entrance door to the 227a hallway and 227b corridor #5. The room currently serves as a lunchroom and meeting area. This room will be a proposed addition to the tour route.

***Electrical Equipment Room.*** The electrical equipment room (room 223) is located north of the front-face work area (room 110). The electrical equipment room contains inactive instrumentation for reactor operations. This room will be a proposed addition to the tour route.

***Accumulator Room.*** The accumulator room (room 222) is located north of the electrical equipment room (room 223) and west of the control room (room 220). The accumulator room contains inactive equipment associated with the accumulator tanks housed within. A doorway on the south side of the room leads to the electrical equipment room (room 223). Concrete stairs with wooden railings lead from the ground level of the accumulator room to a walkway and entrance to the outer rod room on the second level. This room is on the existing tour route.

***Control Room and Offices.*** To the north of and opposite the reactor block, and separated by a 0.9-m (3-ft)-thick concrete wall, is the 60-$m^2$ (650-$ft^2$) main control room (room 220). The control room housed instruments and equipment used to control the reactor and maintain its operational safety envelope. The room was air conditioned and lined with acoustic material. Adjacent to the control room and separated by a glass partition are two control room offices, office 219a and office 219b/c. The control room and offices are part of the current 105-B Reactor Facility tour route. This room is on the existing tour route.

***Fuel Storage Basin/Basin Viewing Room.*** The FSB/transfer area (room 410) is located east of the rear face, separated from the reactor block by a 1.5-m (5-ft)-thick concrete wall. The FSB served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. The FSB consisted of a fuel element pickup area, storage area, and transfer area covered with redwood planking. The FSB is approximately 6 m (20 ft) deep. The redwood planking and the transfer area are visible from the basin viewing room (room 414). The basin viewing room is on the existing tour route.

### 1.4.2 Historical Significance

The DOE, Richland Operations Office (RL) recognizes 105-B Reactor Facility's significant role in our nation's history and the strong public interest in preserving the facility as a museum. The 105-B Reactor Facility was the first production-scale nuclear reactor to be built and successfully operated. Its construction began just 6 months after Enrico Fermi demonstrated a sustained and controlled nuclear chain reaction at the University of Chicago. The 105-B Reactor Facility produced the plutonium used in the world's first nuclear detonation at Alamogordo, New Mexico, and for the nuclear weapon dropped on Nagasaki, Japan.

Because of its historical significance, the 105-B Reactor Facility was declared a National Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers in 1976. In 1992, the National Park Service listed the 105-B Reactor Facility in the National Register of Historic Places, and in 1993, the American Nuclear Society presented the Nuclear Historic Landmark Award to the 105-B Reactor Facility. In 1994, the American Society of Civil Engineers named the 105-B Reactor Facility a National Historic Civil Engineering Landmark. In addition, over the past few years the 105-B Reactor Facility has also received increasing public interest and support from various public groups including the Hanford Advisory Board and the B Reactor Museum Association.

**Figure 1-1. Hanford Site Map.**

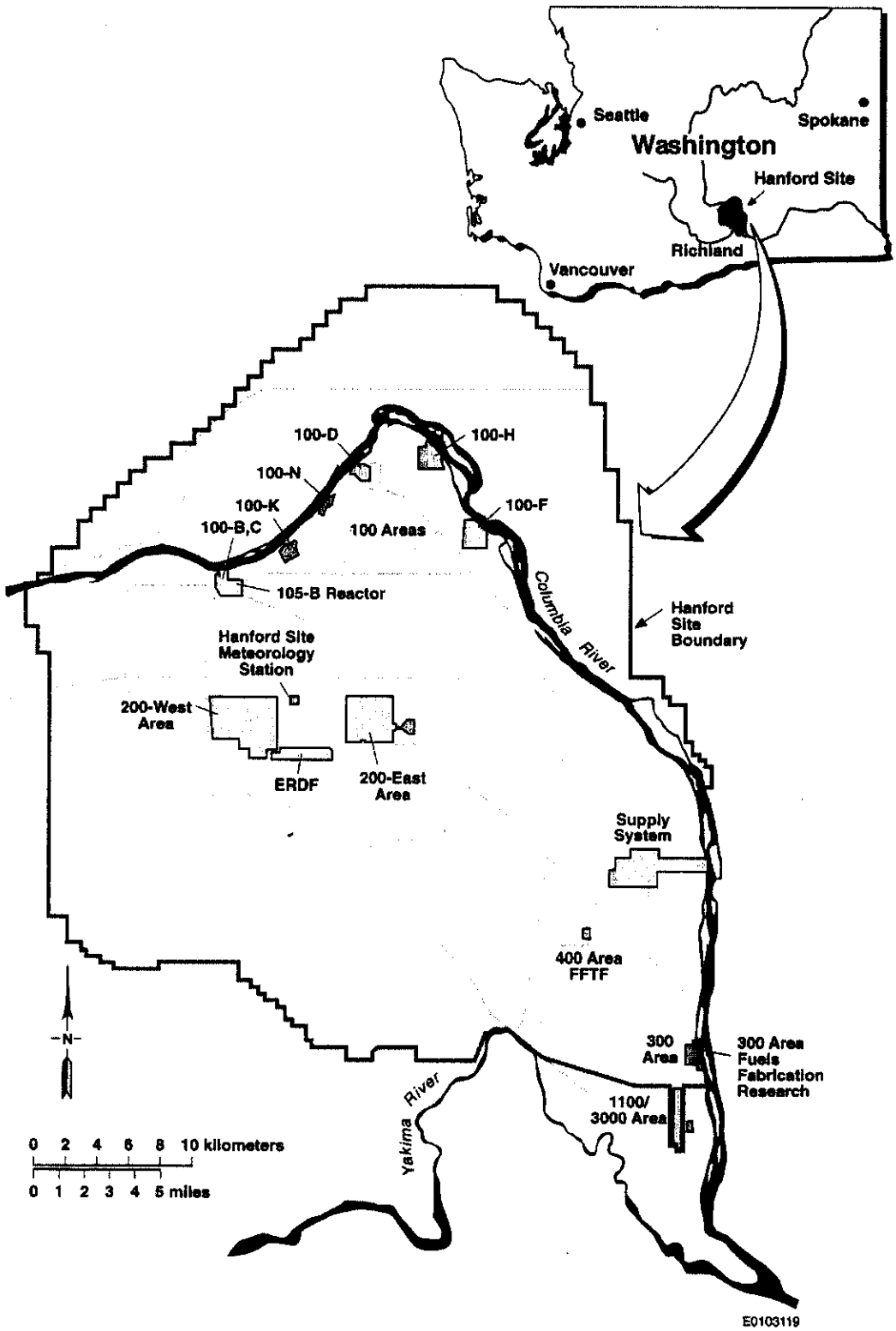


**Figure 1-2. 105-B Reactor Facility.**

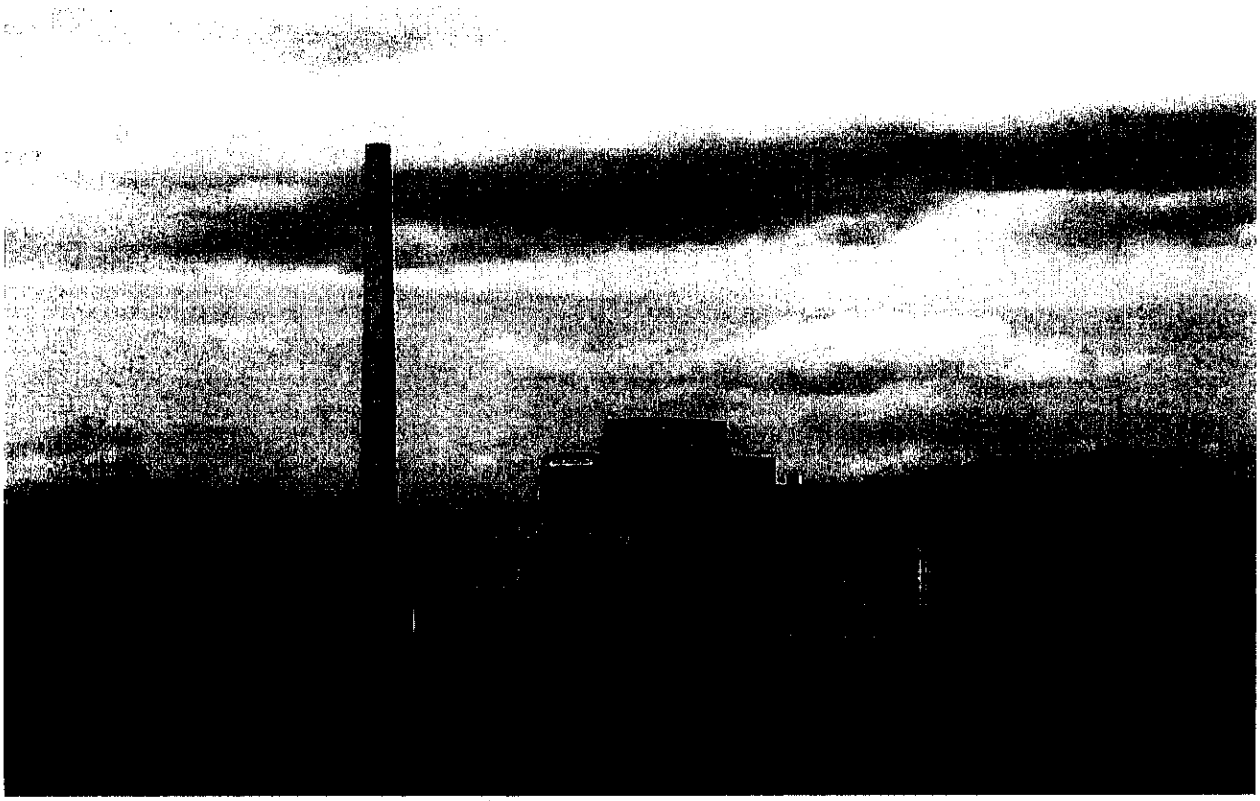
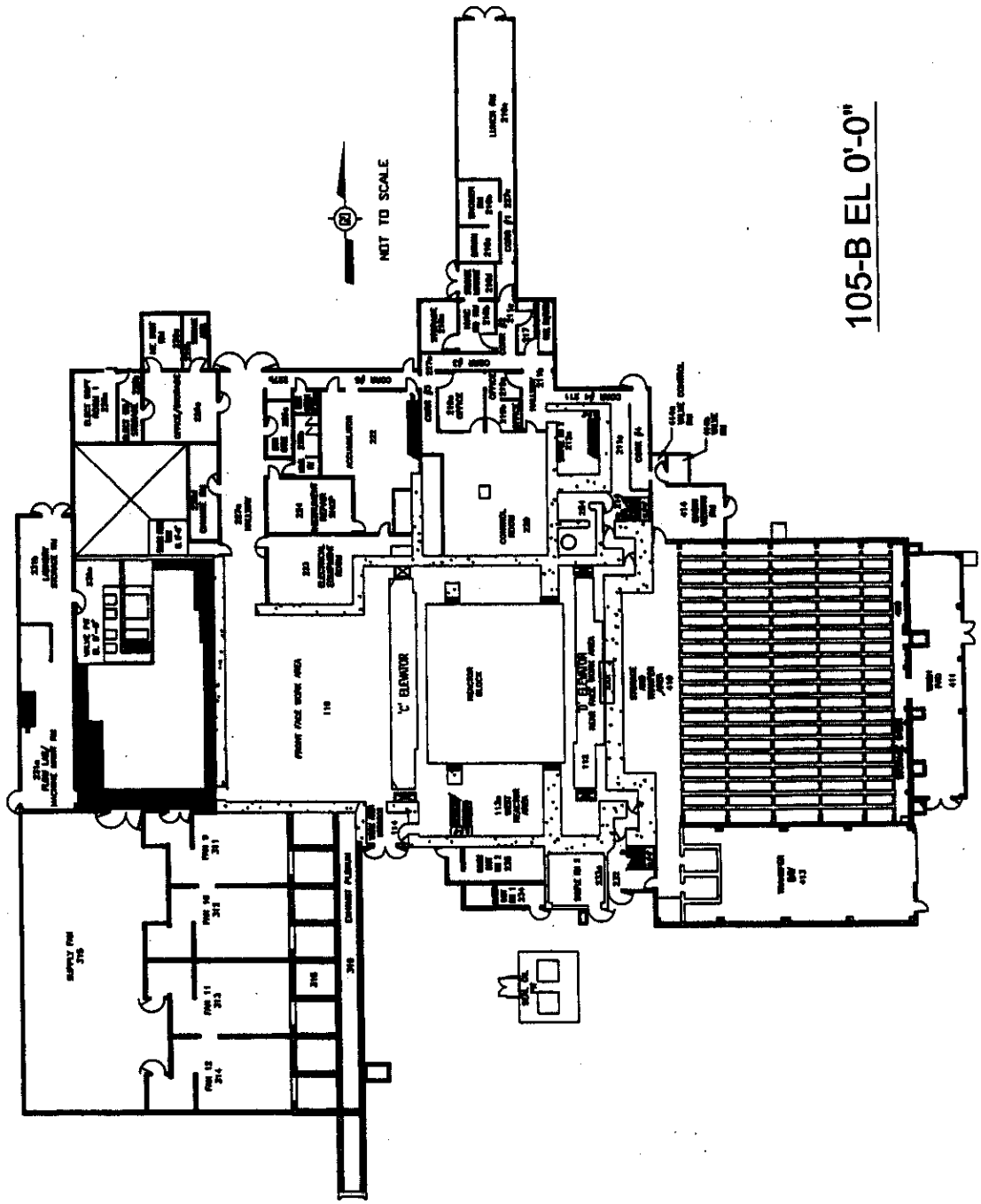


**Figure 1-3. Schematic Drawing of the Ground Floor of the 105-B Reactor Facility.**



# 2.0 REMOVAL ACTION WORK PLAN

The objective of the 105-B Reactor Facility removal action pursuant to the EE/CA (hazard mitigation for public access) is to maintain the 105-B Reactor Facility in a protective manner while not precluding use of portions of the 105-B Reactor Facility for historical interpretation by the public until a decision is made by DOE as to its final configuration.

## 2.1 REMOVAL ACTION WORK ACTIVITIES

The following sections provide a general description of work activities and S&M activities that will be performed for the 105-B Reactor Facility removal action. All of the removal action work activities will require consultation with the Washington State Historic Preservation Office. The general scope of work involved to implement this removal action is included.

### 2.1.1 General Upgrades

**2.1.1.1 Electrical Upgrades.** The existing electrical distribution system located within the 105-B Reactor Facility building is primarily the same system that has been in place since the reactor opened in 1945. The lighting and receptacle power for the facility is currently being provided from the old 2,400-volt emergency system. The existing electrical distribution system has many potential electrical shock hazards that will be mitigated in order to ensure that the safety of workers, public, and the environment are maintained. The upgrade will either maintain the existing 2,400 volt system with the existing transformer (or a new transformer) or provide a 13.8-KV, 3-phase system to the facility and a new transformer for limited heating and some lighting. Lighting and miscellaneous receptacle power will be provided from a 120-V system. Conduits and electrical circuits may be upgraded (as necessary) by pulling new wires. The overall objective of this upgrade is to ensure that the safety of the workers and public is maintained during the next 10-year window.

**2.1.1.2 Roof Panel Repair.** Damaged roof panels have been identified as striking hazards in the fuel pool viewing room (414), corridor 211, corridor 227, the electrical room (110), valve pit (231a), and the supply fan room (315) and require repair or replacement. Roof panels requiring repair or replacement include one panel in room 414, seven panels in corridor 211, one panel in corridor 227, one panel in room 110, one panel in room 231a, and one panel in room 315. Mitigation assumes the use of the unistrut system (WHC 1994), similar to repairs in the valve pit area.

**2.1.1.3 Exterior Hazards.** Various activities will be required to ensure protection of the public, workers, and the environment from hazards outside the 105-B Facility. These activities include the following:

- Removing miscellaneous pipes and conduits that are not architectural-defining elements.
- Cleaning abandoned transformers.

- Restoring wooden structures, doors, handrails, and stairwells.
- Repairing and reconstructing the security fence around the facility.
- Placing asphalt to cover exposed surfaces on the ground.
- Replacing the 105-B Reactor Facility roof. The roof replacement will include replacement of the underlayment board with a new asphalt and pea-gravel covering.

**2.1.1.4 Ventilation.** The 105-B Reactor Facility ventilation system is currently inoperable. Ventilation fans will be installed through the walls of the structure into the work area, except in the control room. These fans will discharge to the outdoors through the exterior walls. The fans will be sized to provide ventilation for occupants and for radon mitigation. In the control room, a new system will be designed and installed to control the elevated radon levels that currently exist. Radon mitigation is currently performed by ventilation of the facility with outside air from open doors to reduce radon levels. In addition, existing ventilation ducts that have in the past provided pathways for water leakage will be blanked off. Installation of ventilation will be performed in a way that will not detract from or adversely impact the existing architecture. Potential air emissions will be assessed and appropriate air monitoring documentation will be obtained, if required.

**2.1.1.5 Fire-Suppression System.** Fire-suppression system upgrades are required and will consist of installing five additional fire extinguishers and a new fire alarm and detection system. Detection devices will be provided along public access routes as well as in locations where early detection of fires in remote areas is necessary. Also, the wall separating the north lunchroom (room 210a) (Figure 2-2) from the rest of the facility will be upgraded to at least a 1-hour fire-resistance rating in accordance with Section 8-3.2 of the National Fire Protection Association's *Life Safety Code*® (NFPA 101®) (NFPA 2000). An additional exit door from the valve pit area to the flow lab/machine maintenance room will be installed, and the door to the outside from the flow lab/machine maintenance room will be made accessible. Any structural upgrades made to the facility will be made with consultation and approval of the State Historic Preservation Office. Emergency lights and exit signs will be installed along the facility tour route.

### 2.1.2 Specific Room Upgrades

**2.1.2.1 Front-Face Work Area.** Two proposed maintenance activities are associated with the front-face work area. These include securing the canvas drop shield and installing safety nets over the area. Details regarding the maintenance activities are as follows:

- The original canvas drop shield has been determined to be an overhead hazard and will be secured to eliminate the hazard. The canvas drop shield will be secured with cables mounted to I-beams. This will provide increased safety for visitors and personnel.

® Life Safety Code and NFPA 101 are registered trademarks of the National Fire Protection Association, Quincy, Massachusetts.

- Safety nets will be hung overhead in the front-face work area to provide additional protection from potential struck-by hazards to visitors and personnel. It is proposed that a large mesh (approximately 10.2-cm [4-in.]) net will be hung below the ceiling in the front-face work area. It is also proposed that a fine-mesh (approximately 2.5-cm [1-in.] square) net be hung from the I-beam above the canvas drop shield to the I-beam west of the C elevator walkway (approximately 18.3 m [60 ft] from the floor). These nets will provide protection over the entire front-face work area and the C elevator area of the front face of the reactor. The netting that will be used is similar to the overhead protection currently employed at the 105-H Reactor Facility for personnel safety.

**2.1.2.2 Exhaust Fan Room Barricades.** Four exhaust fan cells are located adjacent to the fan room. Two cells contain deactivated electric-driven exhaust fans and two cells contain deactivated steam-driven exhaust fans in addition to other miscellaneous equipment. The exhaust fans and the associated ductwork are posted for potential internal radioactive contamination. Additional contamination control is required for these cells. It is proposed to install clear Plexiglas panels along the front opening of each of the exhaust fan cells. The panels would be approximately 1.8 to 2.1 m (6 to 7 ft) in height and would not obstruct or prevent access for periodic S&M activities. Appropriate radiation control markings would be applied to the panels.

**2.1.2.3 Valve Pit Walkway.** The grated walkway around the valve pit room has been identified as a tripping hazard and must meet Occupational Safety and Health Administration (OSHA) code for the safety of visitors and personnel. The proposed mitigation is to apply fire retardant marine-grade plywood decking over the grating. In addition, clear Plexiglas panels will be installed as follows:

- Along the guardrails from the toeboard to the top of the guardrails to mitigate a potential falling hazard into the valve pit area

- Hinged gates along the tour route where worker access will be required

- As necessary, to provide protection for people on the tour route.

**2.1.2.4 Fuel Basin Viewing Room.** The south wall of the FSB viewing area (room 414) is a radiation area. The dose rate at the window was recorded at 0.20 mrem/hr. A handrail will be installed along the width of the viewing room window. This will further reduce potential radiation exposure by preventing visitors from standing closer than 0.3 m (1 ft) from the viewing window. In addition, further reduction of exposure will be accomplished by replacing the existing viewing glass with leaded glass.

**2.1.2.5 Corridors 4 and 211.** Mitigation of hazards in corridors 4 and 211 will include removing a contaminated step-off pad, characterizing and decontaminating radiologically contaminated areas, and repairing roof panels (see Section 2.1.2).

**2.1.2.6 Corridor 227b.** Corridor 227b will require construction of a ramp to eliminate a tripping hazard and repairing a roof panel (see Section 2.1.2).

**2.1.2.7 Electrical Equipment Room.** A tripping hazard will be mitigated through the construction of a ramp.

## 2.2 ROUTINE SURVEILLANCE AND MAINTENANCE

Although all operating/processing equipment inside the 105-B Reactor Facility has been shut down, routine surveillance, maintenance, and radiological monitoring activities will be required to ensure worker and public safety and environmental protection. 105-B Reactor Facility surveillances will include the following:

- Annual surveillance of general facility condition
- Surveillance and maintenance of barriers and postings
- Identification and removal of asbestos
- Container management
- Equipment calibration, testing, maintenance, and repair
- Repair and upgrades of structural components
- Inspection for and response to spills
- Removal/disposal of hazardous materials
- Nondestructive assay, waste characterization, and sampling
- Removal of nonprocess equipment
- General inspections and periodic entries into many areas within the 105-B Reactor Facility to support public access
- Radiological surveys to support public access (e.g., tours) and surveillances
- General housekeeping activities (e.g., floors, displays, tour route areas, bathrooms).

Surveillance activities at the 105-B Facility are conducted in accordance with BHI-FS-01, *Field Support Administration*, Section 3.1, "Surveillance and Maintenance."

## 2.3 FACILITY HAZARDS

Previous work has been performed to define the hazards to the public, workers, and the environment within the 105-B Reactor Facility. This work has been described in the *105-B Reactor Facility Museum Phase I Feasibility Study Report* (Griffin et al. 1995), the *Hanford B Reactor Building Hazard Assessment Report* (Griffin and Sharpe 1999), the *100-B Area Site Specific Health and Safety Plan* (BHI 1999), and the EE/CA (DOE-RL 2001).

### 2.3.1 Hazardous Material Inventory

The 105-B Reactor Facility has been deactivated and all bulk chemical inventories have been removed for recycling or disposal. Some residual quantities of hazardous chemicals may remain in the process lines, tanks, and drains. In addition, several types of hazardous materials remain in the 105-B Reactor Facility, including the following:

- Polychlorinated biphenyls (PCBs) in oils and light ballasts
- Lead paint
- Lead shielding
- Mercury switches, gauges, and thermometers
- Mercury or sodium vapor lights
- Used oil in motors and pumps
- Friable and nonfriable forms of asbestos
- Sodium dichromate from water treatment chemicals.

Lead may exist in surface coatings (lead-based paint), plumbing, and as radiological shielding (lead shot, brick, sheet and cast-lead forms) inside the 105-B Reactor Facility. Workers performing job tasks that involve lead shall follow the applicable requirements of BHI-SH-02, *Safety and Health Procedures*, Volume 3, Procedure 4.2.2, "Lead," and the associated lead work package.

Asbestos-containing materials (ACMs) found in and around the 105-B Reactor Facility in vessel or piping insulation, floor tiles, transite wall coverings or panels, Sheetrock, electrical wire insulation, ducting, or other materials will not be disturbed. Personnel involved in asbestos cleanup will follow the applicable requirements of BHI-SH-02, Volume 3, Procedure 4.2.1, "Asbestos"; BHI-FS-01, Section 8.0, "Asbestos Project Management"; and the associated Bechtel Hanford, Inc. (BHI) asbestos work package.

### 2.3.2 Radiological Material Inventory

Radionuclide inventories may be found in many areas of the facilities. Key radionuclide contaminants are transuranics, including plutonium-239 and americium-241, mixed fission products such as strontium-90 and cesium-137, and activation products such as carbon-14 and cobalt-60, and nickel-63. Contaminants are most likely to be contacted as adherent films and residues encrusted in or on deactivated process equipment, piping, and ventilation system ductwork. In addition, the FSB and associated transfer pit contains radioactive residues and

sediments emitting gamma radiation that results in a direct exposure dose of 0.20 mrem/hr at the viewing window in the FSB viewing room on the tour route.

### 2.3.3 Data Quality Objectives and Sampling and Analysis Plan Requirements

The existing data quality objectives summary report (BHI 1998a) and sampling and analysis plan (DOE-RL 1999) cover the scope of the removal/mitigation of hazards identified in the 105-B Reactor Facility. Therefore, a new data quality objectives summary report and sampling and analysis plan will not be required. The *Sampling and Analysis Plan for Disposition of the Standing Legacy Wastes in the 105-B, -D, -H, -KE, -KW Reactor Buildings* (DOE-RL 1999) addresses the rationale and strategy for the sampling and analysis activities that support disposition of legacy waste at the Hanford Site's reactors. This sampling and analysis plan was based on the data quality objectives developed for the legacy wastes found in the 105-B,105-D, 105-H, 105-KE, and 105-KW Reactor buildings (BHI 1998a).

### 2.3.4 Hazard Analysis for S&M Activities

Hazard analyses are conducted for S&M activities in accordance with the work control process. The project team examines available hazard analysis data and proposed activities, and develops controls for hazards that may pose a threat to workers, the public, or the environment. BHI-SH-02, Procedure 1.7, "Project Safety Planning and Documentation," in concert with BHI-FS-01, Procedure 2.1, "Work Control," and Procedure 2.4 "Job Hazard Analysis," ensure that the appropriate level of safety documentation is implemented for all S&M work activities.

## 2.4 SYSTEMS AND COMPONENTS THAT PROTECT FACILITY WORKERS

There are no active operating systems that are relied upon to control or mitigate the hazards associated with the inactive reactor and ancillary facilities at the 105-B Reactor Facility. The lack of safety-significant structures, systems, and components is consistent with the final hazard classification (BHI 2000a) of the inactive reactor and ancillary facilities as "radiological."

Engineering controls that may be employed during the 105-B removal action (such as during asbestos removal) include temporary confinement enclosures, glovebag containments, and personal protective equipment (PPE). For housekeeping activities, vacuums may be used that are equipped with high-efficiency particulate air (HEPA) and/or charcoal filters, and exhausters will be equipped with HEPA filters. Vacuums that are used for cleaning contaminated areas, will be in accordance with the Washington State Department of Health approved Notice of Construction for portable temporary radioactive are emissions units (DOE 1997). Also, administrative controls such as radiological work permits (RWPs) and asbestos abatement work plans for asbestos removal will be in place as needed. Personnel monitoring and area monitoring will be used as required to determine and document worker exposures and work conditions.

# 3.0 SAFETY AND HEALTH MANAGEMENT AND CONTROLS

## 3.1 EMERGENCY PREPAREDNESS

Procedure manual BHI-SH-03, *Emergency Management Program* (all volumes), complies with and implements the requirements of the *Hanford Emergency Management Plan* (DOE-RL 1998a) and applicable DOE orders. The Emergency Management Program establishes a coordinated emergency response organization capable of planning for, responding to, and recovering from industrial, security, or hazardous material incidents. Specifically for the 105-B Reactor Facility, the emergency action plan is located in BHI-SH-03, Vol. 4, Section 1.0, and reflects the applicable emergency preparedness and response requirements.

Access and keys to the 105-B Reactor Facility are controlled by BHI S&M Field Support personnel. Access will be limited to only those personnel (employees, nonemployees, and/or visitors) who have current training or are escorted by trained personnel. Because of the historical significance and nature of the 105-B Reactor Facility, many areas within the 105-B Reactor Facility will be made available for frequent entries and public access. Nonemployees and visitors touring the 105-B Reactor Facility will be required to stay within the clearly marked, designated tour areas of the facility. Specific training and badging requirements for nonemployees and visitors will be required prior to access to the facility, as follows:

- Frequent visitors (seven or more visits to 105-B Reactor Facility per year) – Hanford General Employee Training (HGET) will be required. BHI will provide the standard computer-based HGET training or provide a "modified" version of HGET training using overheads and classroom lecture as an alternative to accommodate special requests and/or needs. After HGET is completed the frequent visitor will undergo the process for annual badging.

- Infrequent visitors (less than seven visits to 105-B Reactor Facility per year) – HGET will not be required; however, BHI does require General Employee Radiological Training, viewing a 9-minute video, and completing the paperwork for temporary badging. This can be done as a group or individually, with only "1 day" notice.

- One-time visits to 105-B Reactor Facility with an escort – Reading an orientation pamphlet and completing the required paperwork for a temporary badge will be required.

## 3.2 HEALTH AND SAFETY PROGRAM

### 3.2.1 Worker Safety Program

The Environmental Restoration Contractor (ERC) Hazardous Waste Operations Safety and Health Program was developed for employees involved in hazardous waste site activities. The program was developed to comply with the requirements of 29 *Code of Federal Regulations* (CFR) 1910.120 and 10 CFR 835 and to ensure the safety and health of workers during

hazardous waste operations. The principles and practices prescribed within the Integrated Environment, Safety, and Health Management System will be incorporated into all work activities. The program includes the following elements:

- An organizational structure that specifies the official chain of command and the overall responsibilities of supervisors and employees
- A comprehensive work plan developed before work begins at a site to identify operations and objectives and to address the logistics and resources required to accomplish project goals
- A site-specific health and safety plan (SS HASP) (BHI 1999) where workers may be exposed to hazardous substances
- Worker training commensurate with individual job duties and work assignments
- A medical surveillance program administered to comply with OSHA requirements (29 CFR 1910.120)
- BHI-SH-02, Volumes 1 through 4, and project/task-specific implementing plans and procedures
- Voluntary Protection Program.

### 3.2.2 Site-Specific Health and Safety Plan and Job Hazards Analysis

A SS HASP (BHI 1999) has been prepared that provides information regarding the hazards associated with the 105-B Reactor Facility. Building access and work activities are controlled by approved work packages, as required by established BHI/ERC procedures. As part of work package development, a job hazards analysis may be written to identify the hazards associated with specific tasks.

Before work activities begin, a pre-job briefing will be held with the involved workers. This briefing will include reviews of the hazards that may be encountered and the associated requirements. Throughout an activity, daily briefings may also be held as well as special briefings prior to major tasks.

### 3.2.3 Radiological Controls and Protection

The Radiological Controls and Protection Program is defined in DOE-approved programs and BHI-approved procedures (BHI-RC-02 through BHI-RC-05, and BHI-SH-01, *ERC Safety and Health Program*). This program implements the ERC's policy to reduce safety or health risks to levels that are as low as reasonably achievable (ALARA) and to ensure adequate protection of workers. The ERC Radiological Protection Program meets the requirements of 10 CFR 835. Radiological material handling will be managed in accordance with the DOE radiological control

manual (DOE 1994). Appropriate dosimetry, RWPs, PPE, ALARA planning, periodic surveys, and radiological control technical support will be provided.

Standard ERC programs for work in radiological areas are adequate to control the proposed project activities. These programs provide the specific requirements for identified activities, periodic radiation and contamination surveys of the work areas, and periodic or continuous observation of the work by the Radiological Control Organization. The ALARA planning process will identify shielding requirements, contamination control requirements (including local ventilation controls), radiation monitoring requirements, and other radiation control requirements for the individual tasks conducted during the course of the projects.

The 105-B Reactor Facility contains the following radiological areas:

- Radiological Control Areas
- Fixed Contamination Areas
- Radioactive Material Areas
- Radiological Buffer Areas
- Contamination Areas
- High Contamination Areas
- Airborne Radioactivity Areas
- Radiation Areas
- High Radiation Areas.

Prior to the performance of radiologically related surveillance/maintenance or hazard mitigation activities, the proposed activity is discussed with the Radiological Control Organization to determine the scope of the activity and the survey requirements needed. Specific tasks may require an RWP. The RWP will be issued by the Radiological Control Organization to provide direction concerning the isotopes of concern, any specific survey and/or air sampling requirements, appropriate PPE, and dosimetry requirements. Additionally, depending on the work scope and expected radiological conditions, an ALARA review may be required. Radiological control technicians (RCTs) assess radiological conditions of the work/surveillance area in accordance with BHI procedures, document radiological survey results, and ensure correct radiological postings/boundaries of the area.

Areas designated as part of the tour route for public access are designated as a Radiological Control Area. RCT surveys for these areas have shown that radiological conditions do not require dosimetry or an RWP. Visitors must satisfy the following two basic (reading) requirements prior to touring the facility:

- HGET– required for frequent visitors (more than seven visits) to the Hanford Site or General Employee Radiological Training for infrequent visitors (less than seven visits)

- Review of the SS HASP.

If future RCT surveys indicate that the conditions change, the appropriate radiological controls and postings will be implemented in accordance with approved procedures.

# 4.0 ENVIRONMENTAL MANAGEMENT AND CONTROLS

## 4.1 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This criterion addresses whether a removal action will, to the extent practicable, meet applicable or relevant and appropriate requirements (ARARs) and other Federal and state environmental statutes. The ARARs must be met for onsite CERCLA actions (CERCLA Section 121[d][2]). Onsite actions are exempted from obtaining Federal, state, and local permits (CERCLA, Section 121[e][1]). Nonpromulgated standards, such as proposed regulations and regulatory guidance, are also to be considered, to the extent necessary for the removal action to be adequately protective. The ARARs criterion must be met for an alternative to be eligible for consideration.

Key ARARs for consideration include waste management standards, standards controlling releases to the environment, and standards for protection of cultural and ecological resources. A discussion of how the removal action will comply with the listed preliminary ARARs is provided in the following subsections. Where pertinent to the discussion of compliance, materials to be considered have also been included.

### 4.1.1 Waste Management Standards

The *Resource Conservation and Recovery Act of 1976* (RCRA) Subtitle C, implemented via 40 CFR 260 through 279, governs the identification, treatment, storage, transportation, and disposal of hazardous waste. Authority for much of Subtitle C has been delegated to the State of Washington. Implementing state regulations contained in *Washington Administrative Code* (WAC) 173-303 would be applicable to any dangerous wastes generated during the removal action. The regulations require identifying and appropriately managing dangerous wastes and dangerous components of mixed wastes and identifying standards for treatment and disposal of these wastes. The land disposal restrictions (LDRs) established under RCRA (40 CFR 268) prohibit disposal of restricted wastes unless specific concentration- or technology-based treatment standards have been met. The LDRs would be applicable to the treatment and disposal of dangerous or mixed wastes that may be generated during the removal action.

Dangerous and mixed wastes may be generated, and at this time it is expected that these wastes would be primarily characteristic dangerous wastes (e.g., lead-contaminated materials). Some listed wastes (e.g., organic solvents) may also be generated. Both characteristic and listed dangerous or mixed wastes would be designated and managed in accordance with the dangerous waste management standards in WAC 173-303. Any wastes determined to be dangerous or mixed waste would be treated as appropriate to meet the treatment standards of 40 CFR 268. For example, lead-contaminated waste could be encapsulated and disposed at the ERDF.

The *Toxic Substances Control Act of 1976* (TSCA), implemented via 40 CFR 761, regulates the management and disposal of PCBs and PCB waste. At this time, PCBs are identified as potential

contaminants in the 105-B Reactor Facility, and PCB-contaminated waste would likely be generated. In accordance with 40 CFR 761, any PCB-contaminated wastes generated would be managed as PCB remediation waste or as PCB bulk product waste, as applicable. The ERDF is authorized to accept nonliquid PCB wastes for disposal. All waste suspected to contain PCBs would be evaluated to determine if the waste meets the ERDF waste acceptance criteria and disposed at the ERDF if it meets the criteria. Any PCB waste that does not meet the ERDF waste acceptance criteria would be sent to an onsite PCB storage area meeting the substantive requirements for TSCA storage and would be transported for disposal at a TSCA-approved disposal facility. An offsite determination would require approval by EPA, with notification to the State of Washington Department of Ecology (Ecology).

Radioactive wastes are governed under the authority of the *Atomic Energy Act of 1954*. U.S. Nuclear Regulatory Commission performance objectives for land disposal of low-level radioactive waste are provided in 10 CFR 61, Subpart C. Although not applicable to DOE facilities, these standards are relevant and appropriate to any disposal facility that would accept low-level waste generated under this removal action. EPA requirements for disposal of transuranic waste are specified under the "Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Waste" (40 CFR 191). This regulation generally prohibits near-surface disposal of transuranic waste and establishes disposal methods and requirements that include the expectation that containment will be provided for 10,000 years. Radioactive low-level waste would likely be generated and would be disposed at the ERDF, which is authorized to receive low-level waste resulting from remediation activities, as long as the waste meets the ERDF waste acceptance criteria. Transuranic waste may be generated and would be transferred to the Central Waste Complex (CWC) for interim storage pending offsite disposal at a geologic repository such as the Waste Isolation Pilot Plant.

Removal of asbestos and ACM is regulated under the *Clean Air Act of 1955* (40 CFR 61, Subpart M) and by OSHA (29 CFR 1910.1101 and WAC 296-62). These regulations provide standards to ensure that emissions from asbestos are minimized during collection, processing, packaging, and transportation, and to protect asbestos workers. It is possible that some asbestos or ACM would have to be handled during the removal action during S&M (when major repairs are required). In this case, asbestos and ACM will be removed and disposed in accordance with the cited regulations, including appropriate worker protection and packaging. The asbestos and ACM would be disposed at the ERDF.

In addition to the ARARs specified above, the ERDF waste acceptance criteria must be met. The ERDF waste acceptance criteria define radiological, chemical, and physical characteristics for waste proposed for disposal placement and compaction requirements. Waste generated that could not meet or be treated to meet the ERDF waste acceptance criteria would be stored or disposed at an EPA-approved facility. Any waste disposal occurring off of the Hanford Site requires an offsite determination by EPA.

The *Hazardous Materials Transportation Act of 1974* (49 U.S.C. 1801-1813), implemented via the "U.S. Department of Transportation Requirements for the Transportation of Hazardous

Materials" (49 CFR 100 through 179), governs the transportation of potentially hazardous materials, including samples and waste. It is applicable to any wastes or contaminated samples that would be shipped off of the Hanford Site. The removal action may require offsite transportation of potentially contaminated samples and, potentially, of waste. Through implementation of DOE orders and Federal procedures (e.g., EPA's *Revised Procedures for Planning and Implementing Off-Site Response Actions* [58 *Federal Register* 49200]), compliance with this ARAR would be achieved in the handling and shipping of wastes and samples.

Spills or discharges of materials containing greater than 5 parts per million (ppm) of PCBs (measured prior to the spill or discharge) are subject to PCB regulations of title 40 CFR 761. Specific PCB testing methods are identified in title 40 CFR 761.60(g). Regulations at 40 CFR 761.125 establish requirements for PCB spill cleanup. Included are provisions for reporting, cleanup methodology and decontamination requirements, disposal of cleanup debris and materials, and record keeping. Cleanup actions must be completed within 48 hours of discovery of the spill for low-concentration spills involving less than 0.45 kg (1 lb) of PCB. Cleanup actions for high-concentration spills or spills involving more than 0.45 kg (1 lb) of low-concentration PCBs must be completed within 24 hours. Post-cleanup sampling is required in accordance with title 40 CFR 761.130. Title 40 CFR 761.65(c) establishes standards for temporary storage of PCB cleanup wastes in specified containers for a period up to 30 days. Containers in temporary storage must be properly dated, inspected, and labeled. PCB storage records must be maintained. After 30 days, the containers must be moved to an approved PCB disposal or storage-for-disposal facility. Washington State regulates PCBs as dangerous waste (W001) in concentrations between 22 to 50 ppm (WAC 173-303-9904). Exclusions to these regulations are provided in WAC 173-303-071(3)(k).

### 4.1.2 Standards Controlling Releases to the Environment

The Federal and state *Clean Air Acts* regulate both toxic and radioactive airborne emissions. Under implementing regulations found in 40 CFR 61, Subpart H, and WAC 246-247, radionuclide airborne emissions from all combined operations at the Hanford Site may not exceed 10 mrem/yr effective dose equivalent to the hypothetical offsite maximally exposed individual. WAC 246-247 requires verification of compliance, typically through periodic confirmatory air sampling. WAC 173-400-040 establishes requirements for the control and/or prevention of the emission of air contaminants, including dust.

The radionuclide emission standards would apply to any fugitive air emissions of radionuclides generated during hazard mitigation and S&M activities. If it is determined that there is a potential for a nonzero radioactive emission, best available radionuclide control technology would be required.

Standards for surface waste discharges and underground injection of rainwater are applicable to the 105-B Reactor Facility because all floor drains in the building are still intact and discharge to the process sewer, which is also intact. Spills are expected to be fully contained within the 105-B Reactor Facility. However, a variety of release reporting requirements may apply if a

release to the environment were to occur. In addition to spill and release reporting requirements, routine reporting requirements apply to S&M activities as well.

### 4.1.3 Cultural and Ecological Resource Protection Standards

The *Archeological and Historic Preservation Act of 1974* (16 U.S.C. 469-469c) provides for the preservation of historical and archeological data (including artifacts) that might be irreparably lost or destroyed as the result of a proposed action. The *National Historic Preservation Act of 1966* (16 U.S.C. 470, et seq.) and its implementing regulations (36 CFR 800) require Federal agencies to evaluate and mitigate adverse effects of Federal activities on any site eligible for inclusion on the National Register of Historic Places. A total of 14 buildings and structures within the reactor compound have been recorded on historic property inventory forms. Of that number, 10 properties, which include the 105-B Reactor Facility, have been determined eligible for the National Register as contributing properties within the Manhattan Project and Cold War Era Historic District recommended for individual documentation (DOE-RL 1998b). The removal action will comply with the provisions of these historic preservation requirements by maintaining the historically significant 105-B Reactor Facility while not impacting the actions necessary to protect human health and the environment.

Ecological resource protection standards would have limited applicability because very few actions will occur outside of the 105-B Reactor Facility. The *Endangered Species Act of 1973* (16 U.S.C. 1531, 50 CFR 402, and WAC 232-012-297) requires the conservation of critical habitat upon which endangered or threatened species depend and prohibits activities that threaten the continued existence of listed species or destroy critical habitat. The *Migratory Bird Treaty Act* (16 U.S.C. 703) makes it illegal to remove, capture, or kill any migratory bird or any part of nests or the eggs of any such birds. Threatened and endangered species are known to be present in the 100 Areas, but no adverse impacts on protected species or critical habitat resulting from implementation of either alternative would be anticipated, as activities will largely occur indoors.

## 4.2 WASTE MANAGEMENT

Waste management activities will be performed in accordance with waste management ARARs identified in the EE/CA for the 105-B Reactor Facility and as discussed in Section 4.1. The requirements specified by the ARARs and other applicable guidance will be addressed in a site-specific waste management instruction prepared in accordance with BHI-EE-10, *Waste Management Plan*, Part II, Procedure 5.0, "Site-Specific Waste Management Instructions." The site-specific waste management instruction will address waste storage, transportation, packaging, handling, and labeling as they specifically apply to waste streams.

All waste generated at the 105-B Reactor Facility is managed per the directives of a site-specific waste management instruction (SSWMI) in accordance with BHI-EE-10. The SSWMI provides waste-stream-specific management requirements including designation, separation and segregation, waste minimization, packaging, marking and labeling, storage, inspection, transportation tracking, and traceability.

In conducting the removal action (including S&M), various waste streams will be generated. Each waste stream will require specific characterization, designation, and disposal. These waste streams may include the following:

- Solid waste (nonradioactive, nondangerous waste)
- Low-level radioactive waste
- Mixed waste (waste that is both low-level radioactive waste and dangerous waste)
- Hazardous, dangerous, and PCB wastes
- Transuranic waste.

### 4.2.1 Waste Characterization and Designation

Waste generated will be characterized in accordance with *Sampling and Analysis Plan for Disposition of the Standing Legacy Wastes in the 105-B, -D, -H, -KE, and –KW Reactor Buildings* (DOE-RL 1999) and designated in accordance with BHI-EE-10 and the requirements of the receiving facility. The generation of waste will be minimized to the maximum extent practical. Waste materials will be segregated by radioactive content, physical form, and chemical form.

### 4.2.2 Waste Handling, Storage, and Packaging

In general, waste generated from the removal actions discussed in this work plan will either be disposed at the ERDF or at an offsite disposal facility approved by the appropriate regulatory agencies. Wastes may require treatment prior to disposal at the ERDF. If transuranic waste is encountered, storage will be allowed at the Hanford Site's CWC on a case-by-case basis. Specific information on waste handling, storage, and packaging for the wastes that may be encountered during the proposed removal actions is discussed below.

- Waste minimization practices will be followed to the extent technically and economically feasible during all phases of waste management. Waste materials will be recycled, reused, or reclaimed when feasible. Introduction of clean materials into a contamination area and contamination of clean materials will be minimized to the extent practicable. During all phases of waste management, emphasis will be placed on source reduction to eliminate or minimize the volume of wastes that will be generated.

- ACM will be wetted and double-bagged or double-wrapped in plastic according to the site-specific asbestos abatement work plan, which is maintained at the site. ACM packages will be limited to 18.2 kg (40 lb) each. Cement asbestos board has no weight restriction per package. Cut and wrapped pipe will be packaged to meet the requirements of the waste shipping and receiving plan.

- Biological wastes will be packaged in strong-tight containers that will not leak during storage.

- Generally, liquids will be collected in 209-L (55-gal) UN1A2 drums. Aqueous solutions with a pH $\leq$2 or $\geq$12.5 will be stored in 209-L (55-gal) UN1A2 drums. Signs stating "DANGER-UNAUTHORIZED PERSONNEL KEEP OUT" will be posted at each entrance of the storage area and along the boundary as necessary to be seen from any approach to the area. Portable fire extinguishers and spill-control equipment will be available. Containers will not be opened, handled, or stored in a manner that may rupture the container or cause the container to leak. Containers in poor condition will have the contents transferred to a container in good condition. A minimum 76.2-cm (30-in.) separation will be maintained between container rows. A row of containers will be no more than two containers wide. Aqueous solutions with a pH > 2 and < 12.5 may be stored in a large storage tank or in drums.

- Smaller items contaminated with mixed (radioactive and dangerous/hazardous) solids will be packaged in 209-L (55-gal) drums (UN1A2). The weight will not exceed 385.9 kg (850 lb). Larger pieces (e.g., bricks and sheets) shall be double-wrapped in plastic and stored on pallets.

- High-dose radioactive items will be placed in U.S. Department of Transportation-approved containers and shipped to a facility that is approved by EPA. For onsite shipments, high-dose radioactive items will be placed in containers specified by the receiving facility.

- Debris coated with paints that contain $\geq$50 ppm PCB is defined as "PCB bulk product waste" under TSCA. PCB bulk product waste will be managed within the area of contamination until it is loaded into an ERDF container in the onsite area. The ERDF container will be marked with a $M_L$ marking (CAUTION-CONTAINS PCBs). The ERDF container will be closed and securely fitted with a tarp except when adding or removing waste.

- All containers, packages, or items requiring storage in a radioactive material area will be marked/labeled with radioactive material markings and unique consecutive identification numbers. Containers or packages of waste requiring tracking (e.g., hazardous, mixed) will be assigned a package identification number by a Waste Transportation Specialist.

- Nonradioactive solid items will be packaged in 209-L (55-gal) drums (UN1A2). Larger items will be double-wrapped in plastic and stored on pallets. Radioactive solids will be placed in bulk roll-off containers with side-swinging gates (400 and 700 series) for ERDF disposal. The containers will be lined with plastic sheeting and covered by a tarp. Lightweight material such as paper and plastic will be bagged prior to placement in the container to eliminate the potential of the materials blowing out of the container.

- Nonradioactive, dangerous solid wastes that do not meet the ERDF waste acceptance criteria may, with EPA approval, be shipped offsite or to the 1100 Area Excess Yard or the 400 Area Consolidation Center if the material is recyclable. EPA approval will be obtained to ship PCB (TSCA) waste to offsite TSCA disposal facilities.

- Any area containing PCB oils will be marked with signs posting, "DANGER-UNAUTHORIZED PERSONNEL KEEP OUT," at each entrance and along the boundary as

necessary to be seen from any approach to the area. The $M_L$ marking will also be posted. Portable fire extinguishers and spill-control equipment will be available. Containers will not be opened, handled, or stored in a manner that may rupture the container or cause the container to leak. Containers in poor condition will have the contents transferred to a container in good condition. A minimum 76.2-cm (30-in.) separation will be maintained between container rows. A row of containers will be no more than two containers wide.

All containers (except containers used to collect fluorescent light tubes) will be closed and secured when not being filled or emptied. Radioactively contaminated waste will be stored in a radioactive materials storage area that is established, managed, and maintained in accordance with BHI procedures. Containers will be stored to prevent the accumulation of water.
A CERCLA staging area has been established inside the 105-B Reactor Facility in the valve pit and is secured with a locked door. The location of this area has been approved by EPA in EPA and DOE-RL (2001).

### 4.2.3 Waste Treatment

Specific waste streams may be treated to provide safe transport or effective disposal. The type and location of treatment will be determined on a case-by-case basis by DOE and EPA in accordance with the substantive requirements of RCRA and WAC 173-303. Upon lead regulatory agency approval, solidification, encapsulation, and neutralization may be employed to treat various wastes. Other treatment methods may be considered if necessary. For wastes requiring treatment, the techniques will be documented in site-specific waste management instructions or an equivalent treatment document, which will be approved by the lead regulatory agency.

### 4.2.4 Waste Transportation and Shipping

When transportation subcontractor services are used for waste generated during the 105-B Reactor Facility removal action, the subcontractor will be responsible for using and maintaining appropriate transport motor vehicles and providing qualified commercial drivers. All shipments will be made in accordance with U.S. Department of Transportation regulations, 49 CFR 171-179, applicable sections of WAC 173-303, and BHI-EE-12.

### 4.2.5 Disposal

Waste resulting from this action will be disposed at the ERDF or at an offsite disposal facility approved by EPA. Certain wastes may require treatment prior to disposal at the ERDF. Transuranic wastes may be stored at the Hanford Site CWC pending approval by the lead regulatory agency and EPA. Certain materials are eligible for salvage and recycling, provided the appropriate regulatory requirements are met and it is economically feasible for the project to do so. In addition, materials shipped offsite for salvage or recycle must be certified free of radioactive contamination in accordance with the ERC material release program. Liquid waste will be shipped to the Hanford Site's Effluent Treatment Facility (ETF) or treated to meet the acceptance criteria of the receiving facility. Ecology approval is required prior to shipping

contaminated water to the ETF for treatment. *Hanford Site Solid Waste Acceptance Criteria* (FDH 1998) identifies criteria for acceptance of waste at the CWC and ETF. *Environmental Restoration Disposal Facility Waste Acceptance Criteria* (BHI 1998b) and *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility* (BHI 1997) provide the waste acceptance criteria for the ERDF.

### 4.2.6 Waste Management Strategy

Basic waste management strategies are discussed below. However, if a more cost-effective method is available, it may be used. Assuming it is economically feasible for the project, waste materials will be recycled whenever possible.

- **Solid waste.** Solid waste will be managed in accordance with WAC 173-304, with an emphasis on recycling or reuse to the maximum extent possible. Solid waste will primarily be sent to inert demolition waste landfills and for offsite disposal at a municipal/industrial landfill (e.g., the City of Richland landfill). All materials released offsite for disposal, recycle, or salvage must be certified free of radioactive contamination in accordance with the ERC material release program.

- **Low-level radioactive waste.** Low-level radioactive waste that meets the ERDF waste acceptance criteria (BHI 1998b) will be disposed at the ERDF.

- **Mixed waste.** RCRA mixed waste will be managed in compliance with the requirements for both hazardous/dangerous wastes (WAC 173-303) and radioactive waste (10 CFR 61). Where treatment is not deemed feasible, approval will be obtained from EPA to ship waste to an approved treatment, storage, and disposal (TSD) facility. If mixed waste streams are found in quantities large enough to make treatment a viable option, mixed wastes may be treated to meet applicable LDRs and disposed at the ERDF. Small volumes of waste may be treated or accumulated for later treatment.

- **Used oil.** The preferred strategy is to manage used oil (except for PCB oils) as a recyclable material in accordance with the Hanford Site-wide used oil program. Used oil will be evaluated with the material release program. Radioactively contaminated oil that meets the ERDF waste acceptance criteria will be solidified for disposal to ERDF.

- **Hazardous/dangerous wastes.** Common hazardous/dangerous wastes encountered in the retired reactor facilities include mercury, lead, sodium dichromate, and PCBs. Some forms of mercury can be treated as a recyclable material (if not radioactive). If any of these wastes are found to be radioactive, they will be treated as mixed waste. Waste that cannot be treated to meet the ERDF waste acceptance criteria may be shipped to an offsite TSD facility. Waste shipped to an offsite TSD facility must meet the offsite disposal facility waste acceptance criteria and be approved by the lead regulatory agency and EPA. In addition, waste shipped offsite for disposal must be certified free of radioactive contamination in accordance with the ERC material release program.

- **Transuranic wastes.** Waste contaminated with alpha-emitting transuranic radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g at the time of assay is classified as transuranic waste (DOE Order 435.1). Transuranic waste will be managed in accordance with BHI-EE-10. The CWC, operated by the Project Hanford Management Contractor (PHMC), will be used for interim storage of any transuranic waste encountered. Storage of transuranic waste at the CWC requires prior approval by EPA.

## 4.3 CHARACTERIZATION

Characterization, through radiological surveys and sampling/analysis, will be conducted to identify radiological and hazardous conditions that will be encountered during maintenance and waste handling operations. Analytical data generated in these efforts will be used to develop the following information:

- Contaminant identification
- Contaminant concentrations
- Compliance with cleanup standards
- Waste type categories
- Worker health and safety conditions
- Decontamination requirements
- Operational precautions
- Waste treatment requirements
- Waste packaging and disposal requirements.

A selected team of personnel will inspect the portions of the facility where the removal action/maintenance is to occur. The inspection will identify suspect chemical/hazardous and radiological materials in order to identify the waste streams for project planning. Characterization sampling and analysis will be conducted in accordance with the applicable sections of *Sampling and Analysis Plan for Disposition of the Standing Legacy Wastes in the 105-B, -D, -H, -KE, and –KW Reactor Buildings* (DOE-RL 1999).

## 4.4 REPORTING STANDARDS

### 4.4.1 Reporting Requirements for Nonroutine Releases or Abnormal Conditions

**4.4.1.1 Federal Hazardous Substance.** 40 CFR 302 requires immediate notification to the National Response Center upon discovery of a release of a hazardous substance into the environment in excess of a reportable quantity.

40 CFR 355 requires immediate notification to the community emergency coordinator for the local emergency planning committee and to the state emergency response commission for a release of a reportable quantity of an extremely hazardous substance or a comprehensive release of a reportable quantity of an extremely hazardous substance or a CERCLA hazardous substance.

**4.4.1.2 Dangerous Waste/State Hazardous Substance.** WAC 173-303-145 requires immediate notification for any release of a dangerous waste or a state hazardous substance such that human health or the environment is threatened, regardless of the quantity. Notifications must be made to Ecology as well as to local authorities in accordance with the local emergency plan.

WAC 173-303-360 requires immediate notification to Ecology in the event of a release, fire, or explosion at a dangerous waste TSD facility or from a less-than-90-day accumulation area if the event represents an emergency that could threaten human health or the environment. In addition, immediate notification to local authorities is required if the facility emergency coordinator determines that evacuation of local areas may be advisable. A written report on any incident that requires implementation of the facility contingency plan must be submitted to Ecology within 15 days in accordance with WAC 173-303-360(2)(k).

**4.4.1.3 Air Emission System Failure.** WAC 246-247-080(5) requires notification to the Washington State Department of Health within 24 hours of any shutdown, or of any transient abnormal condition lasting more than four hours, or other change in facility operations which, if allowed to persist, would result in emissions of radionuclides in excess of applicable standards. If requested by the Department of Health, a written report must be submitted within 10 days.

**4.4.1.4 Polychlorinated Biphenyl Spills.** 40 CFR 761.125 requires notification in the shortest time possible after discovery (but no later than 24 hours) to the Pesticides and Toxics Substances Branch of the EPA regional office for PCB spills in excess of 4.5 kg (10 lb).

**4.4.1.5 Dangerous Waste Reports.** WAC 173-303-220 requires an annual report from generators of dangerous waste. This provision would apply to any activities undertaken at the 105-B Reactor Facility resulting in the generation of a dangerous waste.

The Tri-Party Agreement (Ecology et al. 1998) requires an annual report pertaining to any LDR mixed waste generated, treated, stored, or disposed of at the Hanford Site. S&M activities at the 105-B Reactor Facility involving LDR mixed waste would need to be included in this report.

The PHMC is responsible for coordination of the preparation and compilation of the dangerous waste reports. The 105-B Reactor Facility S&M project will provide applicable information to the PHMC to support development of these reports, as appropriate.

# 5.0 PROJECT MANAGEMENT AND ORGANIZATION

## 5.1 PROJECT SCHEDULE AND COST ESTIMATE

The 105-B Reactor Facility removal action has been scheduled and estimated using the ERC hierarchy of schedules, which include activity logic and restraints. Activities will be resource loaded for both nonmanual and manual personnel. Equipment needs are identified and other materials are estimated and included in the budgeted cost of work scheduled.

Estimates of project costs have been prepared at the activity level by the project team and subsequently have been reviewed and approved by the ERC, RL, EPA, and Ecology. Cost collection will occur at the code of account level.

The schedule, which encompasses the work scope of the 105-B Reactor Facility removal action (beginning in fiscal year 2002 through project completion), is included in Appendix A. A more detailed schedule, including assumptions, resources, and activity breakdown, will be developed and submitted with the detailed work plans for each fiscal year.

Schedule status is reviewed periodically in review meetings. On a monthly basis, cost and schedule performances are reviewed by the ERC. Members of DOE, EPA, and Ecology are invited to participate in these review meetings.

### 5.1.1 Project Cost and Schedule Tracking

Performance measurement and analysis is performed by the Surveillance, Maintenance, and Transition (SM&T) Project Planning and Controls organization. Project cost and schedule are controlled and updated using the ERC Management Control System, as described in BHI-PC-01, *Baseline and Funds Management System.*

An earned-value system tracks the cost, schedule, and performance for all SM&T projects as they progress towards completion. Cost/schedule performance reports provide budgeted cost of work scheduled comparisons and budgeted costs of work performed against the actual cost of work performed. These reports provide variances to the baseline schedule and cost as budgeted in the project's detailed work plan. Variances above threshold values are documented, as well as the rationale for the variance(s) and any recovery plan required.

Trends and baseline change proposals are readily identified through the ERC formal trend and change control program (BHI-PC-01, PCP 1.11, "Trend Identification, Monitoring, and Analysis," and PCP 1.12, "Baseline Change Control"). All changes that affect the baseline are documented. The ERC trend register, which is reviewed monthly by ERC senior management, categorizes trends from conception to final resolution. Trends are identified as either performance trends or scope trends and are further defined as resolved or unresolved.

Fiscal year project staffing, as budgeted, is reconciled monthly during the project reviews to the actual number of full-time-equivalent personnel used during the month. Likewise, the corresponding number of hours actually worked are presented and compared to the budgeted current work plan. Actual overtime is monitored monthly (by department) and reconciled to the current budgeted overtime.

Cost and schedule variances to the current budget are tracked both on a monthly and to-date basis and are reconciled back to the cause of the variance. Project impacts due to the cost and/or schedule variance are described and corrective actions are identified and tracked to the point of final resolution.

## 5.2 CONDUCT OF OPERATIONS

Conduct of operations is imposed to ensure that work is performed in a controlled and organized manner, that all facets of work activities have been considered, and that necessary documentation is maintained. In accordance with DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*, operations at DOE facilities are to be conducted in a manner to ensure an acceptable level of safety. Operators at DOE facilities have procedures in place to control the conduct of their operations. Line organizations review existing and planned programs important to safe and reliable facility operations and assess the effectiveness of corporate directives, plans, or procedures at facilities under their cognizance.

The *Surveillance/Maintenance and Transition Project Manager's Implementing Instructions* (PMII) (BHI 2000b) provides policy, performance standards, and administrative procedures to support the ERC CONOPs Program. The PMII is based on a graded approach to the conduct of operations authorized by DOE Order 5480.19 Chg 2, and the ERC SM&T conduct of operations applicability matrix. The PMII are applicable to all ERC personnel, assigned or matrixed, who perform activities under the responsibility and direction of the SM&T project manager.

Conduct of operations strongly emphasizes technical competency, workplace discipline, and personal accountability to ensure the achievement of a high level of performance during all activities. Safety is the first priority, and all planning will include appropriate safety analyses to identify potential safety and health risks and the means to appropriately mitigate them. Workers will not start work until approved safety procedures, instructions, and directions that implement the Integrated Environment, Safety, and Health Management System are provided.

Conduct of operations requires workers to be alert and aware of conditions affecting the job site. Operators and workers conducting field activities should be notified of changes in the building and/or work area status, abnormalities, and difficulties encountered in performing project operations. Similarly, operators and workers will notify the chain of command of any unexpected situations. In accordance with the severity of a finding (i.e., emergency condition), notification requirements will be expanded to include upper-tier management and regulatory agencies.

## 5.3 CHANGE MANAGEMENT/CONFIGURATION CONTROL

If a change arises that results in a fundamental change to the selected response action that is not within the scope, then another EE/CA or proposed plan and supporting documentation will be prepared to allow DOE and EPA to select a revised response action.

Established configuration/change control processes ensure that proposed changes are reviewed in relation to the specified commitments. If a breach of these commitments is discovered, work ceases so that stabilization and/or recovery actions may be identified and implemented as appropriate. The BHI off-normal event procedures describe the reporting process and protocol applicable to such a discovery. Change management will comply with BHI-MA-02, *ERC Project Procedures*, Procedure 8.3, "Configuration Management and Change Control (CMCC)." BHI-DE-01, EDPI 4.40-01 defines the Management of Change process for facilities that have a final hazard classification of less than nuclear. The Management of Change process is used for the following purposes:

- Evaluate the impact of proposed changes that could affect authorization basis documents
- Determine whether proposed changes require prior DOE approval
- Evaluate the impact of discovered conditions
- Evaluate the effect of deviations from activities or commitments described in authorization basis documents.

## 5.4 PERSONNEL TRAINING AND QUALIFICATIONS

During the performance of project activities, the experience and capabilities of the operating staff are extremely important in maintaining worker and environmental safety. Day-to-day knowledge of ongoing operations, understanding conditions encountered, and lessons learned are vital to continued safe operations. The ERC Training Program provides workers with the knowledge and skills necessary to safely execute assigned duties. A graded approach is used to ensure that workers receive a level of training commensurate with their responsibility that complies with applicable requirements.

Radiation worker training ensures personnel have been instructed to work safely in and around radiological areas, and to maintain their individual radiation exposure and the radiation exposures of others ALARA. ERC RCTs are required to have completed and be current in RCT qualification training. These training courses require the successful completion of examinations to demonstrate understanding of theoretical and classroom material.

Specialized training will be provided as needed to instruct workers in the use of nonstandard equipment, in the performance of abnormal operations, and in the hazards of specific activities. Specialized training may be provided by on-the-job training activities, classroom instruction and

testing, or pre-job briefings. The depth of training in any discipline will be commensurate with the degree of the hazard(s) involved and the knowledge required for task performance. Some activities will require the acquisition of expert services such as assaying waste packages for disposal.

## 5.5 QUALITY ASSURANCE REQUIREMENTS

The overall quality assurance for the removal action work plan will be planned and implemented in accordance with DOE Order 414.1A, 10 CFR 830.120, and other applicable standards. The quality assurance activities will be graded based on the potential impact on the environment, safety, health, reliability, and continuity of operations. Specific activities include quality assurance implementation, responsibilities and authority, document control, quality assurance records, and audits. These activities are discussed in the following subsections.

### 5.5.1 Quality Assurance Implementation

All project-related activities will establish and implement appropriate quality assurance requirements. Conditions adverse to quality will be identified in nonconformance reports, audit reports, surveillance reports, and corrective action requests. Investigation and corrective actions in response to these adverse conditions will be completed in a timely manner.

### 5.5.2 Responsibilities and Authority

BHI must perform quality engineering, design reviews, surveillance, and audits (as necessary) to achieve quality assurance objectives. BHI must also ensure that the various contractors and design agencies establish design and quality assurance programs to control design in accordance with applicable requirements. The SM&T contractor(s) must establish, implement, and document an inspection plan in accordance with approved specifications and drawings.

### 5.5.3 Document Control

The SM&T documents, such as specifications and drawings, will be controlled in accordance with approved configuration management procedures. The responsible design agency will maintain control of the design documents through acceptance of the documents. A project records checklist will be initiated to identify those records required for the final project file.

### 5.5.4 Quality Assurance Records

Each organization that maintains quality assurance records will be required to control the records in accordance with applicable BHI quality assurance requirements.

### 5.5.5 Audits/Assessments

Internal and external audits are to be performed by the Compliance and Quality Programs organization to ensure project compliance with the quality assurance program requirements.

### 5.5.6 Self-Assessments

Self-assessments will be conducted by project personnel to determine compliance in accordance with the requirements of BHI-MA-02, Procedure 2.7, "Self-Assessment."

## 5.6 PROJECT CLOSEOUT

After completion of all removal action activities, a project closeout report will be prepared. The report will include a general summary of the following: waste dispositioned, project costs, lessons learned, and summarization of characterization and monitoring data. The report will be forwarded to the records retention center where it will be included in the Administrative Record for the 105-B Reactor Facility.

# 6.0 REFERENCES

10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal Regulations,* as amended.

10 CFR 830, "Nuclear Safety Management," *Code of Federal Regulations,* as amended.

10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations,* as amended.

29 CFR 1910, "Occupational Safety and Health Standards," *Code of Federal Regulations*, as amended.

36 CFR 800, "Protection of Historic and Cultural Properties," *Code of Federal Regulations*, as amended.

40 CFR 61, "National Emissions Standards for Hazardous Air Pollutants," *Code of Federal Regulations*, as amended.

40 CFR 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," *Code of Federal Regulations*, as amended.

40 CFR 260, "Hazardous Waste Management System: General," *Code of Federal Regulations*, as amended.

40 CFR 261, "Identification and Listing of Hazardous Waste," *Code of Federal Regulations*, as amended.

40 CFR 262, "Standards Applicable to Generators of Hazardous Waste," *Code of Federal Regulations*, as amended.

40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste," *Code of Federal Regulations*, as amended.

40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Units," *Code of Federal Regulations*, as amended.

40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, as amended.

40 CFR 266, "Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities," *Code of Federal Regulations*, as amended.

40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations,* as amended.

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40 CFR 270, "EPA Administered Permit Programs: The Hazardous Waste Permit Program," *Code of Federal Regulations*, as amended.

40 CFR 271, "Requirements for Authorization of State Hazardous Waste Program," *Code of Federal Regulations*, as amended.

40 CFR 272, "Approved State Hazardous Waste Management Program," *Code of Federal Regulations*, as amended.

40 CFR 273, "Standards for Universal Waste Management," *Code of Federal Regulations*, as amended.

40 CFR 279, "Standards for the Management of Used Oil," *Code of Federal Regulations*, as amended.

40 CFR 302, "Designation, Reportable Quantities, and Notification," *Code of Federal Regulations*, as amended.

40 CFR 355, Appendix A, "List of Extremely Hazardous Substances and Their Threshold Planning Quantities," *Code of Federal Regulations*, as amended.

40 CFR 761, "Polychlorinated Biphenyls (PCBs)," *Code of Federal Regulations*, as amended.

49 CFR 100-179, "U.S. Department of Transportation Requirements for the Transportation of Hazardous Materials," *Code of Federal Regulations,* as amended.

50 CFR 402, "Interagency Cooperation – Endangered Species Act of 1973," *Code of Federal Regulations*, as amended.

58 FR 49200, 1993, "Amendment to the National Oil and Hazardous Substances Pollution Contingency Plan; Procedures for Planning and Implementing Off-Site Response Actions," *Federal Register,* Vol. 58, pp. 49200 (September 22).

*Archeological and Historic Preservation Act of 1974*, 16 U.S.C. 469-469c, et seq.

*Atomic Energy Act of 1954*, 42 U.S.C. 2011, et seq.

BHI, 1997, *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility*, 0000XDC-W0001, Rev. 2, Bechtel Hanford, Inc., Richland, Washington.

BHI 1998a, *Data Quality Objective Summary Report for Phase II of the 105-F and –DR Reactor Buildings*, BHI-01213, Bechtel Hanford Inc., Richland, Washington

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BHI, 1998b, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*, BHI-00139, Rev. 3, Bechtel Hanford, Inc., Richland, Washington.

BHI, 1999, *100-B Area Site Specific Health and Safety Plan*, 0100B-SSHS-G0001, Rev. 1, Bechtel Hanford, Inc., Richland, Washington.

BHI, 2000a, *Surplus Reactor Auditable Safety Analysis*, BHI-01172, Rev. 1, Bechtel Hanford, Inc., Richland, Washington.

BHI, 2000b, *Surveillance/Maintenance and Transition Project Project Manager's Implementing Instructions*, 0000X-PMII-G0001, Rev. 2, Bechtel Hanford, Inc., Richland, Washington.

BHI-DE-01, *Design Engineering Procedures Manual*, Bechtel Hanford, Inc., Richland, Washington.

BHI-EE-10, *Waste Management Plan*, Bechtel Hanford, Inc., Richland, Washington.

BHI-EE-12, *ERC Transportation Manual*, Bechtel Hanford, Inc., Richland, Washington.

BHI-FS-01, *Field Support Administration*, Section 3.1, "Surveillance and Maintenance," Bechtel Hanford, Inc., Richland, Washington.

BHI-MA-02, *ERC Project Procedures*, Bechtel Hanford, Inc., Richland, Washington.

BHI-PC-01, *Baseline and Funds Management System*, Bechtel Hanford, Inc., Richland, Washington.

BHI-RC-02, *Radiation Protection Procedures*, Bechtel Hanford, Inc., Richland, Washington.

BHI-RC-03, *Radiation Control Procedures*, Bechtel Hanford, Inc., Richland, Washington.

BHI-RC-04, *Radiological Control Work Instructions*, Bechtel Hanford, Inc., Richland, Washington.

BHI-RC-05, *Radiological Instrumentation Instructions*, Bechtel Hanford, Inc., Richland, Washington.BHI-SH-01, *Hanford ERC Environmental, Safety, and Health Program*, Bechtel Hanford, Inc., Richland, Washington.

BHI-SH-01, *ERC Safety and Health Program*, Bechtel Hanford, Inc., Richland, Washington.

BHI-SH-02, *Safety and Health Procedures*, Volumes 1 through 4, Bechtel Hanford, Inc., Richland, Washington.

BHI-SH-03, *Emergency Management Program*, Volumes 1 through 4, Bechtel Hanford Inc., Richland, Washington.

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*Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), 42 U.S.C. 9601, et seq.

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# APPENDIX A

# B REACTOR REMOVAL ACTION HAZARD MITIGATION PROJECT SCHEDULE

**Figure A-1. Project Schedule.**